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Farm Financial Records: Financial Analysis

Timothy A. Powell, Raymond E. Massey and James E. Friesen

This is one in a series of four extension publications on farm financial records. Other publications in this series include: EC92-888-C, *Farm Financial Records: Accounting Principles*; EC92-889-C, *Farm Financial Records: Selecting a Computerized Accounting Program*; and EC92-891-C, *Farm Financial Records: Recordkeeping Alternatives for Nebraska Producers*.

Introduction

All farmers and ranchers should have a basic set of financial statements at their disposal and they should know how to analyze and interpret them. Financial records can be used as a management tool, to aid in tax preparation, to provide a basis for credit, and to help in evaluating lease arrangements, contracts, farm insurance, and government programs.

Uniform financial information allows more consistent historical and comparative analysis of farm firms. It also helps develop benchmarks for financial analysis. Access to the secondary market will require consistent financial records. Capital from secondary markets into the agricultural community should benefit farmers with greater availability of credit and possibly lower interest rates. A discussion of financial information consistent with the Farm Financial Standards Taskforce (FFSTF) recommendations follows. It should make you familiar with how to perform a financial analysis of a firm.

Financial Statements

The following financial statements are valuable for a complete financial analysis:

- Balance Sheet
- Income Statement
- Statement of Owner Equity
- Statement of Cash Flows

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Director of Cooperative Extension,

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For a detailed discussion and example financial statements see EC92-888-C, *Farm Financial Records: Accounting Principles*.

Balance Sheet

A balance sheet gives a picture of the financial strength of the firm for a given point in time. It is usually prepared at the end of the firm's fiscal year. The balance sheet does not tell how profitable the firm is or when cash income and expenses occur during the year. The balance sheet is modeled after the fundamental accounting equation:

$$\text{Accounting Equation:} \quad \text{Assets} = \text{Liabilities} + \text{Equity}$$

Balance sheets are usually classified as a market value balance sheet or a cost basis balance sheet. The market value approach is where assets are valued at the current sale price if sold on the open market, less the costs of selling. The cost approach to asset valuation is where assets are valued at the original cost less any depreciation. This is also called the book value of the assets.

In reality, agricultural balance sheets are usually a composite of market value and cost basis. For example, market value balance sheets usually show accounts and notes receivable and investment in growing crops at cost value. Similarly, marketable securities and grain and livestock inventory are usually shown at market value on cost basis balance sheets.

Income Statement

The income statement summarizes income (revenue) and expenses during the year. It tells how much profit was made during the year.

Statement of Owner Equity

The statement of owner equity or net worth shows the breakdown of equity into the two components: (1) valuation equity and (2) retained earnings and contributed capital. The valuation equity is the equity that has accrued due to an increase or decrease in the value of assets (e.g. land value appreciation or depreciation). Retained earnings are generated when profits are reinvested in the business. Contributed capital is the equity invested into the firm by the owner from other sources (e.g., the initial investment).

Statement of Cash Flows

The statement of cash flows lists the sources and uses of cash for the year. This statement is different than the traditional cash flow plan used in agriculture. The main difference is that cash flow activities resulting from operating, investing and financing are shown separately in the statement of cash flows. The statement of cash flows is typically historical, while the cash flow plan is usually projected.

Cash Flow Plan

The cash flow plan is typically used as a budget or planning tool. It is usually divided by monthly or quarterly periods. It shows when estimated cash surpluses and deficits occur. This is useful for projecting borrowing needs.

Financial Analysis

There are two objectives of financial statement analysis. First, the financial condition of the farm business can be measured. Second, financial performance can be monitored over time. Financial information is most commonly analyzed using ratio analysis. Ratio analysis is popular because it allows for consistent comparison of a single farm over time as well as comparisons between farms. Ratios convert nominal dollar amounts to a common basis. For example, a farm with net income of \$10,000 and average total farm assets of \$100,000 is better than one with \$10,000 net income and \$500,000 average total farm assets. Ratio analysis makes this point obvious (10% return vs 2% return). Nominal measures are often used to supplement ratios for financial analysis of a specific firm.

In addition to using ratio analysis in analyzing financial statements, horizontal and vertical analysis may be used. Horizontal analysis is used to look at trends in performance and strength over time. The annual percentage change over time is calculated and compared. Percentage change can be calculated as follows:

$$\text{Percent Change} = \frac{\text{Current Period Value} - \text{Value in Previous Period}}{\text{Value in Previous Period}} \times 100$$

For example, if net income were \$10,000 in the current period and \$8,000 in the previous period, the percent change in net income would be:

$$25\% = \frac{\$10,000 - \$8,000}{\$8,000} \times 100$$

Vertical analysis focuses on within year events rather than over time. Measures can be calculated as follows:

$$\text{Percentage of total} = \frac{\text{Value of Individual Account}}{\text{Value of Total}} \times 100$$

For example, if fuel expense was \$5,000 and total cash expense was \$100,000, the percent of total measure would be:

$$5\% = \frac{\$5,000}{\$100,000} \times 100$$

If this value is substantially different than that reported for firms of like type and size, investigation into underlying causes should be explored.

There are many criteria that can be used to analyze financial statements. The Farm Financial Standards Task Force (FFSTF) recommends using five criteria. They are:

- Liquidity
- Solvency
- Profitability
- Financial Efficiency
- Repayment Capacity

Liquidity

Liquidity is the ability of a farm business to pay current liabilities as they come due in the ordinary course of business, without disrupting the normal operation of the business. In other words, can bills be paid when they come due? Two measures of liquidity are recommended by the FFSTF. Those two measures, along with their calculations, are:

$$\text{Current Ratio} = \frac{\text{Total Current Farm Assets}}{\text{Total Current Farm Liabilities}}$$

$$\text{Working Capital} = \text{Total Current Farm Assets} - \text{Total Current Farm Liabilities}$$

The information needed to measure liquidity can be obtained from the balance sheet of the firm. Deferred taxes resulting from the sale of current farm assets should be included as current farm liabilities for market value balance sheets.

The higher the current ratio, the more liquid the firm. If the current ratio is less than one, the firm is illiquid. Working capital measures the amount of funds available to purchase inputs and inventory after the sale of current farm assets and payment of current liabilities. Negative working capital signifies an illiquid firm.

Limitations of these measures of liquidity include:

- 1) They are a static measure which do not predict future fund flows;
- 2) They ignore lines of credit as financial resources;
- 3) The value of the measures are affected by valuation of current assets;
- 4) They do not measure the quality of the assets;

- 5) The desired level for these measures will vary by enterprise type as well as stage of production.

In addition, working capital is an absolute measure, so it is difficult to use when making comparisons between firms.

Solvency

Solvency indicates the firm's ability to repay all financial obligations if all assets are sold (i.e. will there be anything left if you must sell out?). Three measures of solvency are recommended by the FFSTF. The three measures, along with their calculations, are:

$$\text{Debt/Asset Ratio} = \frac{\text{Total Farm Liabilities}}{\text{Total Farm Assets}}$$

$$\text{Equity/Asset Ratio} = \frac{\text{Total Farm Equity}}{\text{Total Farm Assets}}$$

$$\text{Debt/Equity Ratio} = \frac{\text{Total Farm Liabilities}}{\text{Total Farm Equity}}$$

The balance sheet provides the information needed to calculate these measures. Deferred taxes resulting from the sale of farm assets should be included in each liability class. This ensures that both owner and creditor are aware of the impact of potential tax liabilities.

The ratios can be calculated using either the cost or market value approach to value farm assets. For comparisons between farms the market value approach is normally used. For comparisons between accounting periods for an individual farm operation, the cost approach should be used to value farm assets.

A conservative approach used by accountants is to value the assets at market value or cost, whichever is lower. Using the cost approach is recommended when comparing an individual farm over time because it gives the best measure of asset changes due to retained earnings. It separates changes in equity due to business performance from changes in equity due to valuation.

The cost approach is not used when comparing one firm to another because of the timing of asset acquisition. Two farms with identical assets but purchased at different times would have different values if the cost approach was used. Using the market value approach in these cases should yield similar values.

A debt/asset ratio greater than one indicates the firm is insolvent, i.e. debts are larger than assets. If the firm were forced to sell out, there would not be sufficient funds to pay all liabilities. For example, a farm with \$500,000 assets, \$200,000 debt, and \$300,000 in equity would have the following solvency ratios:

$$\text{Debt/Asset Ratio} = \frac{\$200,000}{\$500,000} = .40$$

$$\text{Equity/Asset Ratio} = \frac{\$300,000}{\$500,000} = .60$$

$$\text{Debt/Equity Ratio} = \frac{\$200,000}{\$300,000} = .667$$

The debt/asset, equity/asset and debt/equity ratios are related since assets equal debt plus equity by the accounting equation identity. The debt/equity ratio is also called the leverage ratio. Many creditors want the debt/equity ratio to be less than one so that the owners have more at stake in the business than the lenders.

Leverage can be good or bad. If the return on assets is greater than the cost of borrowing, then leverage will increase the return to equity. If return on assets is less than the cost of borrowing then leverage will decrease the return to equity. Thus, leverage tends to increase the variability of producer income.

Limitations of these solvency measures include: 1) They are influenced by the valuation of the firm's assets; 2) The desired level for these measures will vary by enterprise type as well as the current economic environment.

Profitability

Information from both the income statement and balance sheet is necessary to calculate measures of profitability. Three profitability ratios are recommended. The ratios, along with their calculations, are:

$$\text{Rate of Return on Farm Assets} = \frac{\text{Net Farm Income From Operations}^1 + \text{Farm Interest Expense} - \text{Value of Operator \& Unpaid Family Labor \& Management}}{\text{Average Total Farm Assets}}$$

$$\text{Rate of Return on Farm Equity} = \frac{\text{Net Farm Income From Operations}^1 - \text{Value of Operator \& Unpaid Family Labor \& Management}}{\text{Average Total Farm Equity}}$$

$$\text{Operating Profit Margin Ratio} = \frac{\text{Net Farm Income From Operations}^1 + \text{Farm Interest Expense} - \text{Value of Operator \& Unpaid Family Labor \& Management}}{\text{Gross Revenue}}$$

¹Net Farm Income From Operations is calculated by subtracting expenses from revenues. The gain or loss from the sale of capital assets is not included.

Net Farm Income From Operations (NFIFO) does not include the gain or loss from the sale of farm capital assets. Including the gain or loss from the sale of a farm capital asset could distort the result, particularly when the asset is farm real estate. Average total farm assets is usually calculated as the average of the total farm assets at the beginning of the year and at the end of the year. Similarly, average total farm equity is the average of the beginning and ending total farm equity for the year. All three ratios are calculated before income and social security taxes are taken out to avoid distortions that can result from various tax situations. For a sole proprietorship, a proxy for the value of operator and unpaid family labor and management is the amount of family living withdrawals.

The rate of return on farm assets and the rate of return on farm equity can be calculated using either the cost or market value approach to value farm assets. Again, for comparisons between farms the market value approach should be used to value farm assets; and for comparisons between accounting periods for an individual farm operation, the cost approach should be used to value farm assets.

A fourth measure of profitability is net farm income, which is a nominal amount. It is taken directly from the income statement.

The rate of return on farm assets (ROA) is independent of how the assets are financed (debt or equity). Therefore, interest expense is added back to earnings. Generally speaking, return on farm equity (ROE) will be larger than ROA when net income is positive. If net income is negative in any year, ROE will be more negative than will ROA. Many feel ROE should be larger than ROA when debt financing is used. This is due to the higher risk associated with equity capital since the return to equity is a residual return. The greater the ROA and ROE, the more profitable the firm.

Limitations of these profitability measures include:

- 1) Withdrawals for family living may overestimate or underestimate the true return to unpaid labor and management;
- 2) The capital gains on assets (farm real estate, etc.) are not included as income, so the returns may seem low when compared to non-farm investments;
- 3) The valuations of assets can affect the ROA and ROE;
- 4) NFIFO is calculated on a pre-tax basis;
- 5) The value of ROA and ROE can vary with the structure of financing (owned vs. borrowed). Non-farm assets, liabilities, and income can affect these measures, so they should be excluded.

Financial Efficiency

Financial efficiency measures the intensity with which a business uses its assets to generate gross revenues and the effectiveness of production, purchasing, pricing, financing, and marketing decisions. Five financial efficiency measures are recommended by the FFSTF. Those measures, along with their calculations, include:

$$\begin{aligned} \text{Asset Turnover Ratio} &= \frac{\text{Gross Revenue}}{\text{Average Total Farm Assets}} \\ \text{Operating Expense Ratio} &= \frac{\text{Operating Expenses (excluding interest \& depreciation)}}{\text{Gross Revenue}} \\ \text{Depreciation Expense Ratio} &= \frac{\text{Depreciation Expense}}{\text{Gross Revenue}} \\ \text{Interest Expense Ratio} &= \frac{\text{Interest Expense}}{\text{Gross Revenue}} \\ \text{Net Farm Income From Operations Ratio} &= \frac{\text{Net Farm Income From Operations}}{\text{Gross Revenue}} \end{aligned}$$

The asset turnover ratio measures capital efficiency. When it is multiplied by the operating profit margin ratio, the result equals the rate of return on farm assets. The other four measures of financial efficiency are called operational ratios and reflect the distribution of gross revenue. Each is calculated by dividing the respective component by either gross revenue (e.g., interest expense / gross revenue) or value of farm production. The sum of the four operational ratios equals 1.0.

Limitations of the asset turnover ratio include:

- 1) The ratio is affected by asset valuation;
- 2) Gross revenues cover the accounting period, but average total farm assets represent two points in time;
- 3) The ratio can vary by type of farm enterprise.

Limitations of the operational ratios include;

- 1) The ratios are sensitive to the accuracy of information used;
- 2) NFIFO is calculated on a pre-tax basis;
- 3) The depreciation expense ratio varies by type of farm enterprise.

Repayment Capacity

Repayment capacity is the last criterion recommended by the FFSTF. It differs from the other four because it is used to measure the borrower's repayment capacity for term debts and capital leases, rather than to measure financial position or performance of the business.

Two repayment capacity measures are recommended. Both measures include nonfarm income because a high percentage of farmers and ranchers rely on both farm and nonfarm income to help service term debts and capital leases. These measures enable the analyst to evaluate the borrower's repayment capacity, regardless of the source of funds used to make payments. The two measures, along with their calculations, are provided below.

Term Debt and Capital Lease Coverage Ratio	=	Net Farm Income From Operations + Total Nonfarm Income + Depreciation Expense + Interest on Term Debts + Interest on Capital Leases - Total Income Tax Expense - Withdrawals for Family Living
		Annual Scheduled Principal and Interest Payments on Term Debts and Capital Leases
Capital Replacement and Term Debt Repayment Margin	=	Net Farm Income from Operations + Total Nonfarm Income + Depreciation Expense - Total Income Tax Expense - Withdrawals for Family Living - Payments on Prior Period Unpaid Operating Debt - Principal Payments on Current Portions of Term Debts - Principal Payments on Current Portions of Capital Leases - Total Annual Payment on Personal Debt

The term debt and capital lease ratio measures the ability of the firm to cover all term debt and lease payments. The greater the ratio over one, the greater the margin to cover payments. The capital replacement and term debt repayment margin measures the availability of the firm to generate funds to repay debts with maturity greater than one year. These measures basically show whether the firm can be expected to repay existing and future debt.

Limitations of these measures include:

- 1) Measures do not evaluate the timeliness of cash generated or payments due;
- 2) They do not recognize different amortization methods (e.g. balloon payment loans);
- 3) Stability of non-farm income can vary from borrower to borrower;
- 4) Measures will vary depending on enterprise type and degree of diversification of firm;

- 5) The capital replacement and term debt repayment margin is an absolute amount, so it is difficult to compare between firms.

Table 1 summarizes the financial measures, definition and interpretation.

Cautions and Conclusions

Standard financial measures provide a basis for evaluating the financial condition and performance of the farm firm, but measures are only as good as the data used. The measures must be calculated from accurate and consistent data sources. For example, using market value for asset valuation one year and cost basis another year will cause obvious problems when comparing the financial position of the firm between years.

Care must be taken when comparing firms with different enterprises or firms of differing size. Also, the point in the business cycle or time of year the statements are prepared can affect financial measures.

The FFSTF gives the following advice for users of financial measures.

1. Measures help ask the right questions, but do not provide answers.
2. Informed judgement should be used to complement financial measures.
3. Different measures are appropriate for different farm types.
4. Benchmarks are needed to assess the financial position and performance of the firm.
5. Measures derived from poor data are usually misleading and can lead to bad decisions.

References

Recommendations of the Farm Financial Standards Taskforce: Financial Guidelines for Agricultural Producers 1991.

Table 1. Summary of Financial Measures and Interpretation

MEASURE	DEFINITION	INTERPRETATION
LIQUIDITY:		
Current Ratio	$\frac{\text{Total Current Farm Assets}}{\text{Total Current Farm Liabilities}}$	If greater than one, firm is liquid. If less than one, firm is illiquid.
Working Capital	Total Current Farm Assets - Total Current Farm Liabilities	If positive, firm is liquid. If negative, firm is illiquid.
SOLVENCY:		
Debt/Asset Ratio	$\frac{\text{Total Farm Liabilities}}{\text{Total Farm Assets}}$	The lower the value, the more solvent the firm. If greater than 1, firm is insolvent.
Equity/Asset Ratio	$\frac{\text{Total Farm Equity}}{\text{Total Farm Assets}}$	The higher the value, the more solvent the firm.
Debt/Equity Ratio	$\frac{\text{Total Farm Liabilities}}{\text{Total Farm Equity}}$	The higher the value, the less solvent the firm.
PROFITABILITY:		
Return on Assets	$\frac{\text{Net Farm Income From Operations} + \text{Farm Interest Expense} - \text{Value of Operator \& Unpaid Family Labor and Management}}{\text{Average Total Farm Assets}}$	The higher the value, the more profitable the firm.
Return on Equity	$\frac{\text{Net Farm Income From Operations} - \text{Value of Operator \& Unpaid Family Labor \& Management}}{\text{Average Total Farm Equity}}$	The higher the value the more profitable the firm.
Operating Profit	$\frac{\text{Net Farm Income From Operations} + \text{Farm Interest Expense} - \text{Value of Operator \& Unpaid Family Labor \& Management}}{\text{Gross Revenue}}$	The higher the value, the more profitable the firm.

MEASURE	DEFINITION	INTERPRETATION
EFFICIENCY:		
Asset Turnover Ratio	$\frac{\text{Gross Revenue}}{\text{Average Total Farm Assets}}$	The higher the value, the more efficient the firm.
Operating Expense Ratio	$\frac{\text{Operating Expenses (excluding interest \& depreciation)}}{\text{Gross Revenue}}$	The higher the value, the less efficient the firm. Can vary by farm type.
Depreciation Expense Ratio	$\frac{\text{Depreciation Expense}}{\text{Gross Revenue}}$	The higher the value, the less efficient the firm. Can vary by farm type.
Interest Expense Ratio	$\frac{\text{Interest Expense}}{\text{Gross Revenue}}$	The higher the value, the less efficient the firm. Can vary by farm type.
NFIFO Ratio	$\frac{\text{Net Farm Income from Operations}}{\text{Gross Revenue}}$	The higher the value, the more efficient the firm.
REPAYMENT CAPACITY:		
Term Debt and Capital Lease Coverage Ratio	$\frac{\text{Net Farm Income From Operations} + \text{Total Nonfarm Income} + \text{Depreciation Expense} + \text{Interest on Term Debts} + \text{Interest on Capital Leases} - \text{Total Income Tax Expense} - \text{Withdrawals for Family Living}}{\text{Annual Scheduled Principal and Interest Payments on Term Debts and Capital Leases}}$	The higher the value, the greater the repayment capacity of the firm. If less than one, then the firm is unable to meet repayment demands.
Capital Replacement and Term Debt Repayment Margin	$\text{Net Farm Income from Operations} + \text{Total Nonfarm Income} + \text{Depreciation Expense} - \text{Total Income Tax Expense} - \text{Withdrawals for Family Living} - \text{Payments on Prior Period Unpaid Operating Debt} - \text{Principal Payments on Current Portions of Term Debts} - \text{Principal Payments on Current Portions of Capital Leases} - \text{Total Annual Payment on Personal Debt}$	The higher the value, the greater the repayment capacity of the firm. If negative, then the firm will be unable to meet repayment schedule.